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ABSTRACT

The physical fitness and lifestyle of Canadian school children has been deteriorating in recent years. The main objectives of physical education are directed toward the development of physical fitness and a positive lifestyle. This manual provides an opportunity for measuring the components of physical fitness. Physical fitness testing involves the measurement of body fat percentage, posture, muscular endurance, muscular strength, cardiovascular endurance, speed, power, flexibility, agility, and basic motor skills. This manual presents the norms compiled as a result of the Manitoba Schools' Physical Fitness Survey 1976-77, specifies test procedures, and suggests desirable fitness objectives. Suggestions for administering the test and motivating students are also included. It is suggested that teachers make the testing program an integral part of the physical education program. The suggested exercises can be utilized in progressive stages to improve physical fitness. The test results can act as a guide to the teacher for making program modifications to attain objectives and as a motivator for the students to strive for higher levels of performance. Appendices present norms for males and females from five to eighteen years of age, a suggested reference table for body fat percentage, and a cross country time sheet. (CJ)

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MANITOBA PHYSICAL FITNESS PERFORMANCE TEST MANUAL AND FITNESS OBJECTIVES FOR MANITOBA YOUTH

5 – 18 Years of Age

based on

THE MANITOBA SCHOOLS' PHYSICAL FITNESS SURVEY

1976-77

Published by:

Manitoba Department of Education

1977

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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PREFACE

The results of research into the development of standardized test procedures have long been of use to teachers in motivating and assisting students to improve their levels of fitness and motor performance.

In recent years, a wealth of research, related to physical fitness generally, and to the physical education of school children in particular, has become available. From this comprehensive evidence, we know that our students are physically unfit, overweight and inactive. Research tells us further that they smoke too much, watch television for too many hours and would ride rather than walk to school. These negative aspects of health and physical fitness are increasing year by year, and empirical evidence suggests that the academic performance of students may be affected negatively, by these low levels of physical fitness.

During 1976, the Physical Fitness Survey was designed and conducted to assess the physical fitness levels of Manitoba students. There is no doubt that this survey should have not only provincial, but national and international significance as well, because it has included valid means for measuring cardiovascular fitness, flexibility and the percentage of body fat. These components are not usually included in most physical fitness tests, and surely not at the elementary school level.

By publishing this manual, the Department of Education hopes that the data supplied will help to generate wide interest in and reinforce the need to ensure the optimal physical development of all children. Our primary objective is to enable young people to enjoy physical activity as a means toward improving their physical well-being.

THE DEVELOPMENT OF THE MANITOBA PHYSICAL FITNESS ACHIEVEMENT OBJECTIVES

HISTORY

Physical Fitness Testing Project (1959)

During the period 1959-64, there was a deep public concern about the physical fitness of school children. This concern gave rise to a number of studies and projects. Two examples of fitness testing programs conducted to assess fitness levels of Manitoba youth at that time were: *The Physical Fitness Testing Project 1959*, sponsored by the Manitoba Branch of the Canadian Association for Health, Physical Education and Recreation; and the Dr. G.R. Cumming Physical Fitness Studies of Winnipeg School Children (1964 and 1966), funded by the Fitness and Amateur Sport Directorate.

The C.A.H.P.E.R. Fitness Performance Test (1966)

In 1963, the Board of Directors of the Canadian Association for Health, Physical Education and Recreation requested its Research Committee to design and undertake a project which would establish national norms of physical fitness for Canadian children. Their directive stated that this was "a matter of considerable urgency in the national plan regarding fitness and amateur sport".

The research project was designed to establish fitness norms for Canadian boys and girls from 7 to 17 years of age. The Committee agreed that each test item selected was a valid and reliable measure of fitness and simple enough for any teacher, not trained in fitness measurement, to administer. The same test items were to be used for boys and girls at all ages and consideration was given to limiting the time and equipment needed for the test. The selected battery of tests was a unique one, but the items were familiar to allow comparison with other published tests. The speed sit-ups, standing broad jump, shuttle run, flexed arm hang, 50 yard run and the 300 yard run items were used.

Schools were randomly selected from each province. The number of schools selected in each province was proportional to its school age population. A total of 135 schools were selected, 6 from Manitoba. 500 boys and 500 girls in each age group were selected from these schools. The testing was initiated in September, 1964, and completed in 1965.

The tests were administered by a specially trained team, which travelled throughout Canada. The data was processed and national norms were presented in 1966 to all schools throughout Canada.

Canada Fitness Awards Program (1966)

The national focus on fitness was given added impetus in the same year, with the announcement by the Canadian Centennial Commission of a physical fitness incentive awards project, which would involve and challenge school-age children during the Centennial of Canadian Confederation.

The Manitoba Physical and Motor Fitness – Performance Test (1967)

During 1967, the Centennial Athletic Awards Program was conducted throughout Canada under the sponsorship of the Canadian Centennial Commission, in cooperation with the provinces and territories. Over 1,250,000 Canadian children and youth between the ages of 6 and 18 years who took part in the program earned an award. This figure included 152,403 students in Manitoba schools, and represented 70% of the provincial enrollment. The project in Manitoba was coordinated and administered by the Physical Education Branch of the Department of Youth and Education, in cooperation with local divisional school authorities.

With the emphasis on participation, the program was designed to:

- motivate, stimulate and encourage youth to develop and maintain a high level of physical fitness;
- recognize and honor outstanding physical achievement through a series of special Centennial awards;
- stimulate improvement in health and physical education programs in the schools.

Students participating and completing the program earned one of the three crests (Gold, Silver, Bronze) or a Red Shield denoting participation. Students were expected to meet or better the standards compiled for each event to earn any of the three crests. The lowest standard scored in any of the four events determined the award.

The three compulsory test items (standing broad jump, 300 yard run and one minute speed sit-ups) were selected from the C.A.H.P.E.R. Fitness — Performance Test Manual and represented the 95th, 85th and 75th percentile respectively for these tests. Swimming, skating and a cross-country run made up the "optional" events from which students selected one.

The Manitoba data was statistically analyzed to accomplish the following:

1. develop norms which would give an indication of the current fitness status of Manitoba children;

2. develop norms for cross-country running, skating and swimming, which were non-existent, both at the provincial and national level;
3. compare "new" Manitoba norms, based on the three compulsory items, to the existing national (C.A.H.P.E.R.) norms.

Fit for '70 Performance Norms (1970)

An investigation and statistical analysis of about 70,000 individual results of participants in the Manitoba 1970 Centennial Athletic Awards Program resulted in the development of new norms. Height and weight norms were compiled and a statistical comparison made of six test item averages between Manitoba (1967) and Manitoba (1970).

The C.A.H.P.E.R. Fitness Test norms, the Canada Fitness Awards program, the Centennial Athletic Awards program and the "Fit for '70" projects all served to stimulate interest and to motivate teachers and children to strive to improve general fitness and participation throughout our school system. Fitness testing became an important aspect of many physical education programs.

THE MANITOBA SCHOOLS' PHYSICAL FITNESS SURVEY 1976-77

As indicated in the historical section, the physical fitness and lifestyle of Canadian school children have been deteriorating in recent years. We have been able to determine the status of physical fitness and the relationship of fitness to student lifestyles in Manitoba by examining the following:

- *the relationships existing between the various parameters of lifestyle that may affect a student's fitness and academic performance levels;*
- *the physical fitness of Manitoba school children;*
- *the percentage of students overweight.*

Over 10,000 school children were tested, 5 to 18 years old. The province was divided into nine geographical regions. One or more schools were randomly selected out of each region, so that all grades would be represented within a region. An attempt was made to survey 600 students in each age group. The purpose of this manual is to present the norms compiled as a result of this survey; to specify test procedures; and to suggest desirable fitness objectives.

Desirable Fitness

The following specific objectives for school children and teachers have been identified by a Department of Education Physical Education Task Committee (1976–1977). These objectives are related to the physical/health needs of all individuals. Teachers

AGE GROUPS																
Physical Fitness Components	**STUDENTS**															
	5	6	7	8	9	10		11		12		13		14		15	
Cardiovascular						M	F	M	F	M	F	M	F	M	F	M	F
— 800 M	5:00	4:45	4:30	4:15	4:00												
—1600 M						9:00		8:30		8:00							
—2400 M												12:00	13:00	12:00	13:00	12:00	13:0
One Minute Speed Sit-Up	20	25	30	32	34	37	36	40	38	43	40	46	40	46	40	46	4
Sit & Reach Flexibility	33 cm	33 cm	33 cm	33 cm	33 cm	33 cm		33 cm		33 cm		33 cm		33 cm		33 cm	
Flexed Arm Hang	15	18	21	24	27	30	29	34	31	39	33	45	35	45	35	45	3
% Body Fat												Maximum of 15%	23%	Maximum of 15%	23%	Maximum o 15%	23%
Basic Motor and Activity Skills	Demonstration of: Basic motor skills affected by factors of coordination, rhythm, balance and body awareness, including: walking, running, hopping, skipping, catching, kicking, galloping, sliding, leaping, climbing, rolling, striking, skating, swimming.					General activity skills and knowledges. Basic motor skills which are formalized into low organized adapted games or specialized sport situations.						Specific sport skills and knowledges, team sports, dual sports, lifetime sports, exercising and fitness training methods.					
Lifetime Sports	All students and teachers should be encouraged to participate regularly (all year) in vigorous physical activities at least four times per week. Students should be strongly encouraged to participate regularly in school and community physical activities.																
Posture	For all students and teachers, good posture, flatness of abdomen and balanced muscular development is desirable. Teachers should assess their students' posture yearly and provide remediation or medical referral where necessary.																

Lifestyle Objectives

and administrators should recognize that specific fitness levels may be achieved in progressive stages. Handicapped individuals will be able to achieve, in some degree, all of the outlined objectives.

AGE GROUPS																	
						TEACHERS											
16		17		18 & 19		20 - 30		30 - 40		40 - 50		50 - 60		60+			
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M			
2:00	13:00	12:00	13:00	12:00	13:00	12:00	13:15	12:45	14:15	13:45	15:15	14:20	16:15				
46	40	46	40	46	40	46	40	43	37	40	33	37	31				
33 cm		33 cm		33 cm		33 cm		33 cm		33 cm		33 cm		33 cm			
45	35	45	35	45	35	45	35	43	33	41	31	39	29				
Maximum of		Maximum of		Maximum of		Maximum of		Maximum of		Maximum of		Maximum of		Maximum			
15%	23%	15%	23%	15%	23%	15%	23%	15%	23%	15%	23%	15%	23%	15%			

ll lifetime sports skills, exercises and tness training methods.	Participation on a regular basis in a variety of activities is essential to maintain general activity skills and health.

Nutrition	Teachers should become aware of overweight nts and should encourage them to lose weight by increasing their activity levels and monitoring caloric intake. Teachers should be conscious of their own weight; set an example. Student nutritional status assessment should be undertaken yearly. Students should receive body weight control and nutrition education instruction and, if possible, integrated with other subject areas. Administrators and teachers should positively reinforce good nutrition practices in schools.
Lifestyle	Factors detrimental to good health, including smoking, drug and alcohol abuse, overeating and general lack of regular physical activity, are of concern and should be dealt with through appropriate educational processes.

THE ROLE OF PHYSICAL FITNESS TESTING

The main objectives of physical education are directed towards the development of physical fitness and a positive lifestyle. This manual provides an opportunity for measuring the components of physical fitness. Physical fitness measures correlate quite highly with recreational competency and neuro-muscular skills. A sound, basic approach in motivating recreational participation is to become fit enough to participate meaningfully. The development of efficiency through physical education is enhanced when the participants can identify their own physical potential and thereby recognize and respect the physical potential in others.

Physical fitness testing involves the measurement of per cent body fat, posture, muscular endurance, muscular strength, cardiovascular endurance, speed, power, flexibility, agility and basic motor skills. The one minute sit-up measures strength and endurance of the abdominal muscles, the flexed arm hang measures upper body endurance, the sit and reach measures flexibility, the shuttle run measures agility and the meter run measures cardiovascular endurance.

An advisable approach in using this test manual is to make the testing program an integral part of the physical education program. The suggested exercises can be utilized in progressive stages to improve physical fitness. The test results can act as a guide to the teacher for making program modifications to attain objectives and as a motivator for the students to strive for higher levels of performance.

MOTIVATION EVAULATION TECHNIQUES

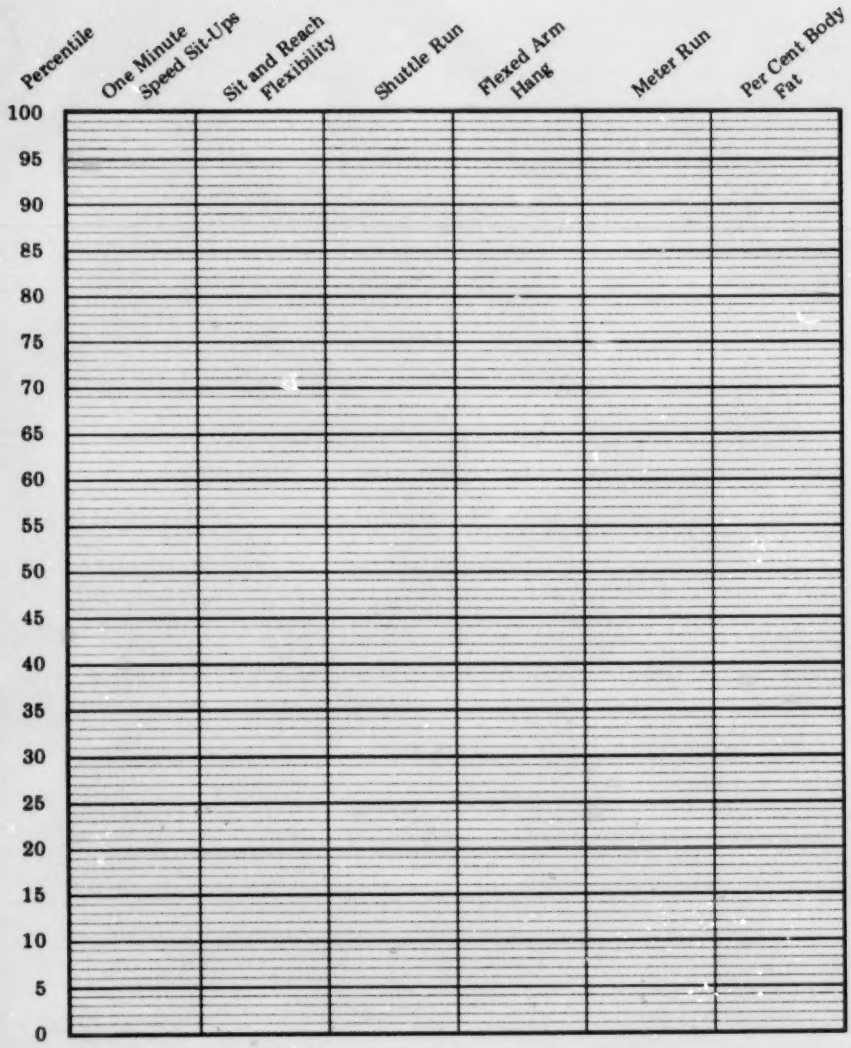
Students should have an opportunity to learn the values of physical education and have an opportunity to participate in a vigorous and comprehensive program. Student motivation will be dependent upon both experiential and rational factors. A sound motivational strategy would be to:

a) provide students with sound information on the immediate and long term benefits of exercise;

b) simultaneously ensure that the program enables students to experience these benefits.

Numerous external motivational aids can assist the teacher and student to achieve optimum objectives in physical education. Two motivational aids are presented here. The Personal Profile Record is useful in monitoring an individual's progression in the physical fitness components during a one-year term. If the test is administered three times during a one-year period, the progression can be plotted on this record. The Cumulative Fitness Record is useful in plotting the progression of a student as his/her age increases.

PERSONAL PROFILE RECORD



NAME _____ HEIGHT _____

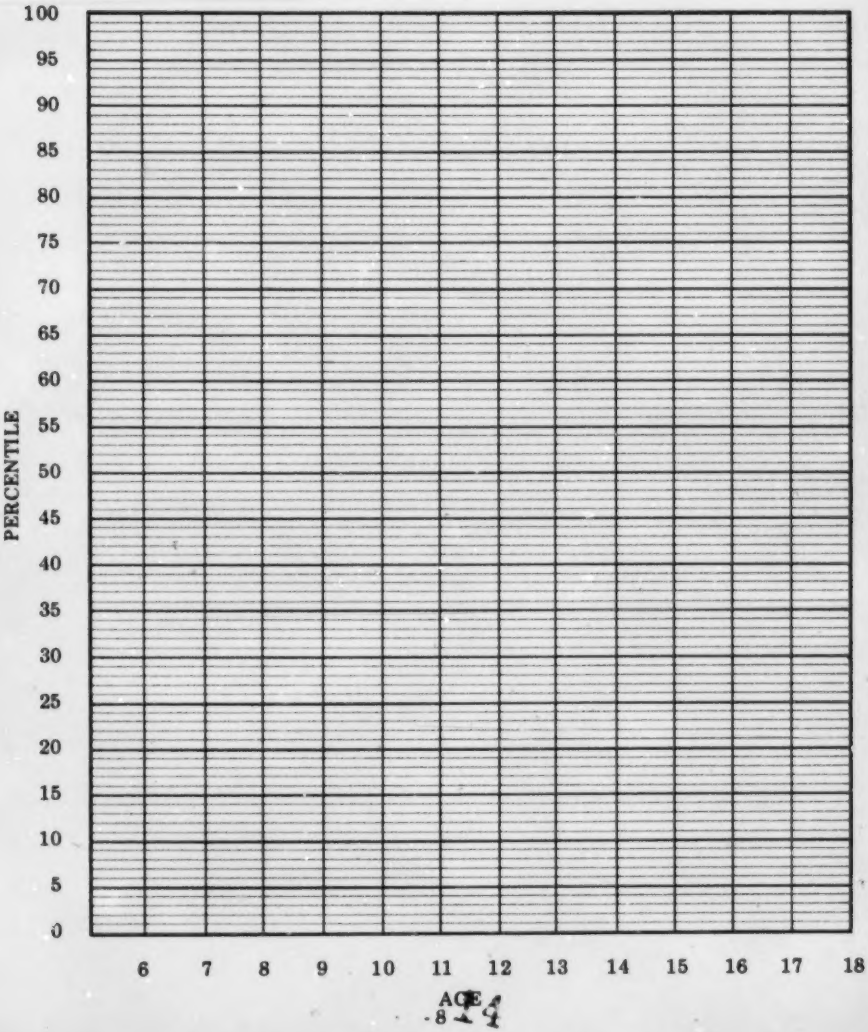
AGE _____ Date - Test 1 _____

Test 2 _____

WEIGHT _____ Test 3 _____

CUMULATIVE FITNESS RECORD

Legend		NAME _____
One Minute Speed Sit-Ups	_____	Red
Sit and Reach Flexibility	_____	Black
Shuttle Run	_____	Brown
Flexed Arm Hang	_____	Green
Meter Run	_____	Blue
Per Cent Body Fat	_____	Orange



GENERAL GUIDELINES FOR TEST ADMINISTRATION

Orientation

Before any testing is done, discuss physical fitness in general:

- What is physical fitness?
- Why be physically fit?
- How can physical fitness be attained and maintained?
- Why is regular exercise and physical recreation needed?
- How can physical fitness and physical performance be measured?
- How can physical fitness and physical performance be improved?
- What is the relationship between lifestyle, health and physical fitness?
- What physical fitness component will each test item measure?
- What are the specific fitness objectives for each age group?

Preparation

Instruct students in the purpose of the tests; what each test measures; and how each test is performed, measured and scored.

Demonstrate each test item.

Instruct and guide students in conditioning and training techniques as suggested for each test item.

Instruct leaders to assist in testing.

Be thoroughly familiar with the administrative controls suggested for each test item.

Prepare master score sheets for each group being tested.

Provide each student with a personal score card. This could be a copy of his/her age table from the Manual and will let the student know how he/she ranks in each test item according to the Manitoba norms.

Insure that students understand how to interpret percentile scores.

Suggested Test Procedures

1. Have students report to the gymnasium, dressed appropriately for exercise.
2. Provide all students with identical instructions.
3. Have each student complete a data sheet under the supervision of a classroom teacher or a physical education teacher.
4. Kindergarten and grade one students could pair off with grades five or six students, for more effective operation and recording.

5. Perform tests in the following order:

   a) One minute speed sit-ups (partner assistance for holding and counting).
   b) Agility run.
   c) Divide students into small groups for movement from station to station to complete the following tests:
      — height and weight;
      — skinfold measures (per cent body fat);
      — flexed arm hang. (Provide assistance to younger students for positioning)
   d) Perform the cardiovascular portion of the test:
      — 5 to 9 years of age — 800 meters;
      — 10 to 12 years of age — 1600 meters;
      — 13 and up years of age — 2400 meters.

Apparatus

Timing:
1. Stop watches (calibrated to one-tenth second) should be used for the one minute speed sit-ups, agility run, flexed arm hang and the cardiovascular test.
2. Test watches daily for calibration.
3. Repair watches that deviate more than one-tenth of a second from the other watches.
4. Two watches should be used wherever possible.

Body Weight:
1. A medical weigh scale should be used.
2. Read measurements to the nearest one-half of a kg.
3. Check scales regularly for accuracy.
4. Weigh subjects without shoes.

Height:
1. Tape a two meter measuring tape to the gymnasium wall.
2. Place a carpenter's level on the top of each subject's head and record the height when the level is exactly parallel to the floor.
3. Measure each subject without shoes and with heels touching the wall.
4. Record measurements to the nearest mm.

Mats: Utilize gymnastic mats for sit-ups and beneath the flexed arm hang bars for safety.

Flexed Arm Hang Bars:
1. Use chinning bars or gymnastic high bars.
2. In schools where no bars are available, use doorway expander bars.
3. Climbing frames and free suspended bars can be used to expedite this test.
4. Keep bar diameters between 1¼ and 1¾ inches.

Flexometer: Use a modified Wells and Dillon sit and reach flexometer for the flexibility test.

Agility Run:
1. Using masking tape and existing gymnasium floor lines.
2. For blocks, use 2" x 4" x 3" wooden blocks or blackboard erasers.
3. To ensure good traction, instruct subjects to run in gym shoes or in bare feet.

Skinfold:
1. Use a Harpenden skinfold caliper to measure standardized tricep, bicep, sub-scapular and supra-iliac skinfolds. (left side)
2. Use the Van Huss method (four site procedure) to determine per cent body fat.

Cardiovascular Run:
1. Use numbered manilla tag strips, 1" x 8", at the finish line.
2. Administer the test on an oval, outdoor playground track.
3. Use pilons or flags as markers.
4. Record results on an official cross-country timing sheet (Appendix C).

Keeping Fitness Records

In addition to the personal and cumulative profile charts illustrated in this Manual, other recording and motivation aids can also be used by teachers. For example, the average score on each test item for the class, as well as the average score for each age in the school, can be determined from the performance scores of students recorded on master score sheets. This will enable each boy or girl to compare his/her own score with their classmates, with their own age in school and with the Manitoba average.

Conversion of Performance Scores to Percentile Scores

The percentile score shown for each test indicates the percentage of scores which lie below a particular score, or stated another way, the percentage of individuals who have not attained a particular score. For example, the girl who has a percentile score of 60 on a test item has performed at a level higher than 60 per cent of all the girls her age who were tested when the norms were developed.

It will be noted that the percentile scale is in steps of five. An individual can move up several steps by performance of, for example, one more sit-up. Where performance scores are duplicated in successive steps, always use the highest percentile listed. However, if the performance score attained is not shown on the performance scale, then assign the percentile score which corresponds to the next lower value.

TEST ITEMS

Fitness Component
Description
Scoring
Equipment
Administrative Suggestions

TEST ITEMS

The test items included in this survey were body weight, standing height, agility run, sit and reach, sit-ups, flexed arm hang, skinfold measurements and the meter run.

The test items were selected on the basis of research studies which have found the tests to be sufficiently valid and reliable measures of fitness. The agility run is a questionable test. The tests are simple enough to be readily administered with the minimum amount of equipment. The same test items were used for boys and girls.

BODY WEIGHT

Equipment: A calibrated medical scale. A common bathroom scale should not be used.

Stance: Each subject should stand erect on the scale in stocking feet, with indoor clothing.

Scoring: The weight is recorded to the nearest one-half of a kilogram.

HEIGHT

Equipment: A metric non-stretch tape and a ruler, a carpenter's level or a meter stick.

Stance: Subjects assume a stand tall, flat-footed position against the metric tape on the wall. The heels, buttocks, shoulders and head should touch the wall. No shoes should be worn.

Scoring: The tester should place the ruler, level or meter stick on the subject's head and against the wall, so that it is level or parallel to the floor. The value is recorded to the nearest one-half centimeter.

One Minute Speed Sit-Ups

Fitness component measured: abdominal muscular endurance

Test Description:

Starting Position:

1. Lie on back, preferably on gym mat (or grass).
2. Interlock fingers behind the head.
3. Bend knees, feet flat and slightly apart, heels as close to the body as possible.
4. Have partner sit on feet, with hands firmly on calves just below the knees.
5. Starting signal: Ready — Go!"

Performance:

1. Sit up and touch both elbows to both knees.
2. Return to starting position with back of shoulders touching the floor. Keep head up and chin down throughout.
3. During the action, maintain feet, knee and hand position throughout, with back of shoulders touching the floor following each sit-up.
4. Repeat as many times as possible in one minute.
5. The partner counts the sit-ups.

Scoring:

1. Count one sit-up each time the elbows touch the knees.
2. A rest between sit-ups is allowed if needed before the one minute is up.
3. Record each valid number of sit-ups.

Equipment:

1. Gym mat.
2. A stop watch.

20

Administrative Suggestions:

1. The supervising tester will act as the timer.
2. Partners will count and record each other's score.
3. Several pairs can be tested at once.
4. In order to obtain an optimum score, perform to a near maximum rate continuously throughout the one minute time period.
5. Insure that the students curl up and down, maintaining a round spine.

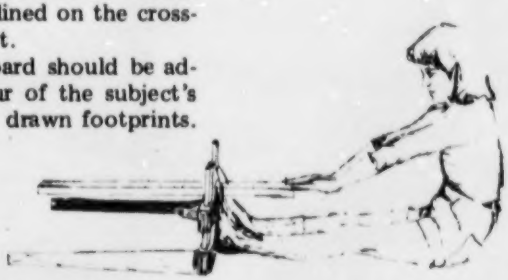
Sit and Reach

Fitness component measured: flexibility

Test Description:

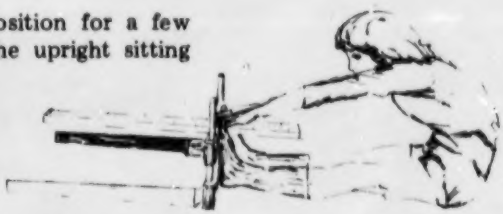
Starting Position:

1. Each subject assumes a sitting position with the legs fully extended and with the feet against the footprints outlined on the crossboard, shoulder width apart.
2. The height of the crossboard should be adjusted so that the contour of the subject's feet does not overlap the drawn footprints.



Performance:

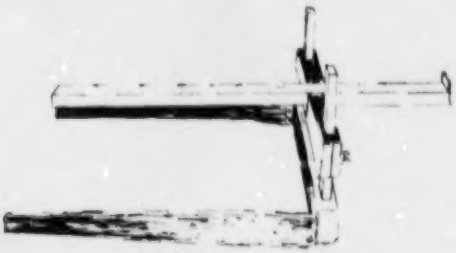
1. The subject reaches forward, palms down and both hands even, along the scale.
2. The fingers slide along the scale, moving the distance marker forward.
3. The subject holds this position for a few seconds and returns to the upright sitting position.



Scoring:

1. The maximum distance reached is recorded as the measure of flexibility.
2. If the hands reach out unevenly, repeat the test.
3. Record the best score in two trials.
4. The measurement is taken to the nearest centimeter.

Equipment:



Modified "Wells and Dillon" sit and reach flexometers.

Administrative Suggestions:

1. The sit and reach apparatus should be placed against a wall to prevent any movement in the apparatus during the testing procedures.
2. The best procedure to keep the legs extended is to place an arm across the knees of the subject so that any bending at the knees can be monitored.
3. If the legs come off the floor, repeat the test.

Flexed Arm Hang

Fitness component measured: upper body muscular endurance

Test Description:

Starting Position:

1. Each subject should take a reverse grasp on the bar (palms to face), hands shoulder width apart and eyes at the level of the bar. The arms are fully bent.
2. The face should not touch the bar. Subject should be assisted to the starting position.
3. Any swinging motion of the subject should be stopped prior to commencing the test.

Performance:

1. Each subject should attempt to hold the start position as long as possible.
2. Verbal motivation is advantageous.

Scoring:

1. The total period of time in seconds that the subject can maintain the start position is recorded.
2. The bar level should be maintained between the eyebrows and the tip of the nose.
3. When the subject's forehead drops below the bar, timing stops.

Equipment:

1. The bar should not be more than one and one-half inches or 1.81 cm in thickness. A gymnastics high bar apparatus is very good. An adjustable doorway gym bar or horizontal bar placed at 4-6 feet (1.3 to 1.7 meters) may be adequate. The bar should be placed lower for primary students and higher as students become older.

Administrative Suggestions:

1. Additional stations can be set up if equipment is available.
2. It is essential that the subjects receive encouragement through verbal motivation.
3. Place a gymnastics mat under the horizontal bar as a safety precaution.
4. Test stop watches each day before use to check for calibration.

Agility Run

Fitness component measured: agility

Test Description:

Starting Position:

The subject lies face down, hands at the sides of the chest and the forehead on the starting line.

Performance:

1. On the signal, the subject jumps to his/her feet and runs 30 feet to the line.
2. He/she picks up one block of wood, returns to the starting line and places the block behind the line.
3. He/she returns to the initial line, picks up the second block of wood and runs back across the finish line.

Scoring:

1. Measurement is in terms of seconds to the nearest tenth of a second from the starting signal until the subject's chest crosses the finish line.
2. Record the best of two trials.

Equipment:

1. Two wooden blocks (2" x 4" x 3") per subject.
2. A stop watch calibrated to one-tenth of a second.

Administrative Suggestions:

1. If sufficient testers and equipment are available, set up several stations and run the students simultaneously.
2. Verbal motivation is very helpful and necessary.
3. The test should be administered with the subjects in good gym shoes or bare feet.
4. The suggested starting signals are: On your mark, get set, go.
5. Two trials with sufficient rest between are allowed and the better trial is recorded.

Meter Run

Fitness component measured: cardiovascular fitness

Test Description:

Starting Position:

1. A standing position is assumed.
2. Reinforce "pace" and honest personal effort at this time.
3. Mass start in groups of 50 or less is possible.

Performance:

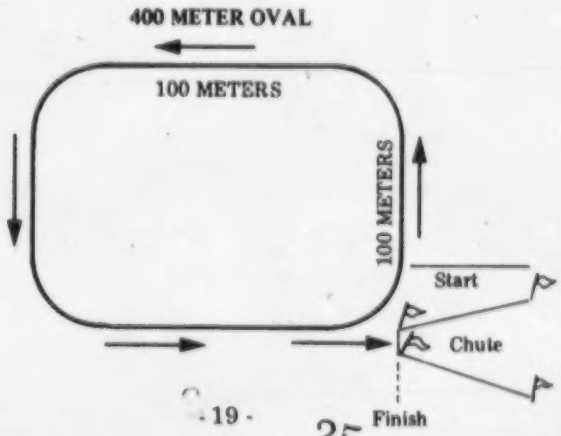
1. Cross country race procedures should be followed.
2. All runners start on the signals "ready" and "go".
3. Lap times and encouragement should be given.
4. When the students finish the distance, one official calls out the time, a second official calls out and hands the runner a numbered tag and the third official marks the number opposite the time on the cross country score sheet.
5. Students should be instructed to walk around slowly after the run for two to five minutes, then return to the marshalling area, keeping their numbered tags.
6. Tags are collected in gym and times properly recorded.

Scoring:

The elapsed time from the starting signal to the passage of the runner's chest across the finish line is scored to the nearest second.

Equipment:

1. Two stop watches.
2. Cross country score sheet (Appendix C).
3. A minimum of four field markers.
4. Numbered tags (1-50).
5. Level circular 400 meter track or a designated 400 meter square marked off on a level field area.



Administrative Suggestions:

1. *Caution* — Be aware of medical problems, and their influence on participation.
2. Set up a "chute" at the finish line as illustrated in the diagram.
3. Several participants being tested at the same time is essential to complete this test in a reasonable time frame.
4. Runners should "pace" themselves throughout the test and supervising personnel can offer verbal motivation throughout the test.
5. Locate the supervising staff around the test circuit.
6. Walking is permitted, but the object of the test is to cover the required distance in the shortest possible time.
7. "Jostling" should not be allowed at the beginning of the race or during.

Skinfold Measurement

This is a measurement of percentage body fat (subcutaneous). The test item is applicable for grades 7 - 12.

Test Description:

1. The following procedure standardizes the technique for percentage body fat measurements:
   a) firmly grasp a fold of skin between the left thumb and forefinger, and lift up (subcutaneous tissue only);
   b) place the contact surfaces of the caliper about 1 cm from the fingers;
   c) very slightly release the pressure of the fingers so that the greater pressure is exerted by the caliper;
   d) release the scissor grip (right hand) supporting the weight of the caliper in the right hand;
   e) when the needle stops, take the reading to the nearest tenth of a millimeter (be careful of jaw face slippage on the skin).

2. The locations of the subcutaneous fat measurement sites and the measurement techniques are illustrated in the accompanying diagrams.

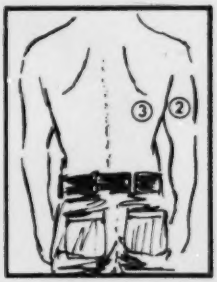
   – *Bicep:* the skinfold should be lifted on the front surface of the left upper arm over the prominence and middle of the biceps muscle. The arm should hang relaxed and the skinfold should be lifted parallel to the long axis of the humerus.

— *Triceps:* half-way down left arm between tip of acromion and top of the radius, with the fold picked up in a line passing directly up the arm from the tip of the olecranian process. The arm hangs relaxed at the side.

— *Sub-scapular:* just below the angle of left scapular, the fold being picked up parallel to the natural cleavage line of the skin.

— *Supra-iliac:* the skinfold is located immediately above the crest of the left ilium. The fold should be lifted at a slight angle to the vertical.

1 – Bicep
4 – Supra-iliac



2 – Tricep
3 – Sub-scapular

Scoring:

1. The readings (four site procedure; left side) are recorded in a cumulative total (mm).
2. This total skinfold measurement (mm) is then referred to the suggested reference table for per cent body fat (Appendix B).
3. The per cent body fat is recorded.

Equipment:

1. A Harpenden caliper.
2. Reference table for per cent body fat (Appendix B).

Administrative Suggestions:

1. It is necessary to train the persons administering the test in the use of the skinfold caliper.
2. Appropriate loose fitting clothing is suggested to allow for easy access to skinfold testing sites (back, side).
3. Skinfold measurements can be accurately measured only at sites where a proper "fold" of subcutaneous tissue (not muscle tissue) can be raised.
4. If it is possible to secure two or three calipers, it is very advisable to set up more than one station.

SUGGESTIONS TO IMPROVE PERFORMANCE

ABDOMINAL MUSCULAR ENDURANCE (as measured by speed sit-ups)

1. Sit-ups with the following progressions:

   (i) sit-backs (reverse sit-up procedure — repeat)
   (ii) lie on back, raising head and shoulders (partial sit-up)
   (iii) sit-up, using arm momentum
   (iv) sit-ups with hands at sides — at shoulders — on head — over head (note progressions)

2. Increase bent knee sit-up speed with 10, 20 and 30 second sit-ups.

3. Increase bent knee sit-up endurance by gradually increasing the time limit beyond one minute (slower rate).

4. Combine sit-ups with trunk twisting.

5. Tensing and relaxing stomach muscles.

UPPER BODY MUSCULAR ENDURANCE (as measured by the flexed arm hang)

1. Perform the following exercises on a regular basis:

   (i) ball squeeze
   (ii) crab walk
   (iii) medicine ball throwing
   (iv) push-ups (proper progressions)
   (v) chin-ups
   (vi) dips
   (vii) partner chin-ups

2. Possible activities to enhance performance are:

   (i) gymnastics
   (ii) rope climbing
   (iii) rowing
   (iv) weight training
   (v) swimming

AGILITY (as measured by the agility run)

1. Possible exercises which will improve performance are:
   - (i) jumping
   - (ii) hopping
   - (iii) zigzag running
   - (iv) shuttle running
   - (v) stops and starts
   - (vi) activities involving directional changes
2. Numerous activities which include:
   - (i) tag games
   - (ii) red light, green light
   - (iii) dodge ball
   - (iv) soccer
   - (v) European handball
   - (vi) racquet sports
   - (vii) volleyball
   - (viii) basketball

FLEXIBILITY (as measured by the sit and reach test)

1. Perform regularly, exercises that involve slow stretching, bending, twisting and arching (hamstring stretches, alternate toe-touching).
2. Some possible activities are:
   - (i) gymnastics
   - (ii) yoga
   - (iii) modern dance
   - (iv) ballet
   - (v) swimming

CARDIOVASCULAR FITNESS (as measured by the meter run)

1. Aerobic exercises and activities (vigorous exercise performed in time limits of 10 minutes or more) which will improve performance include:
   - (i) all forms of running and jogging
   - (ii) skipping
   - (iii) continuous total body exercise
   - (iv) circuit training
   - (v) orienteering
   - (vi) soccer
   - (vii) cycling
   - (viii) cross-country skiing
   - (ix) field hockey
   - (x) cross-country running
   - (xi) swimming

APPENDIX A

5 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	134	35.2	12.4	45.0	43	61.2	4:06
95	120	25.5	14.2	40.0	30	31.0	4:40
90	118	24.0	14.5	39.0	26	25.0	4:51
85	118	23.0	14.9	38.0	23	22.7	4:58
80	116	22.0	15.3	37.6	21	18.0	5:07
75	116	21.5	15.4	37.0	20	16.6	5:15
70	115	21.0	15.7	36.7	19	14.1	5:20
65	114	20.5	16.0	36.0	18	13.0	5:26
60	114	20.0	16.0	35.0	16	11.5	5:31
55	113	19.8	16.3	34.0	15	10.5	5:36
50	112	19.5	16.5	33.5	13	9.5	5:39
45	111	19.0	16.8	33.0	11	8.4	5:43
40	111	18.9	17.0	32.0	10	7.1	5:46
35	110	18.5	17.1	31.0	8	6.0	5:52
30	109	18.4	17.4	30.0	6	5.0	5:59
25	108	18.0	17.8	29.5	4	4.0	6:05
20	108	17.5	18.5	29.0	2	3.4	6:15
15	107	17.0	19.0	27.0	1	2.0	6:30
10	106	16.4	19.6	26.0	0	0.0	6:45
5	104	15.9	20.4	24.0	0	0.0	7:15
0	97	14.1	27.7	3.3	0	0.0	8:20
Mean	112.3	20.0	16.9	32.9	13.3	11.6	5:44
Std. Dev.	5.2	3.2	2.2	5.6	9.8	9.9	0:47
Sample	276	276	268	278	281	270	211

5 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	127	35.0	13.3	43.0	72	94.0	4:05
95	120	24.8	14.0	40.0	27	40.1	4:39
90	118	23.5	14.4	38.0	23	27.5	4:53
85	118	23.0	14.7	36.0	22	22.0	4:59
80	117	22.4	14.9	35.5	20	19.8	5:07
75	116	22.0	15.1	34.8	18	17.0	5:11
70	115	21.7	15.3	34.0	16	14.9	5:15
65	115	21.4	15.5	33.1	15	13.1	5:21
60	114	20.5	15.8	32.6	14	11.0	5:26
55	113	20.1	15.9	32.0	13	10.0	5:30
50	113	20.0	16.1	31.4	12	9.6	5:34
45	112	19.8	16.4	30.5	11	8.9	5:38
40	112	19.5	16.6	29.8	9	7.9	5:44
35	111	19.1	16.8	29.0	8	6.9	5:53
30	110	18.9	17.1	28.0	6	5.6	6:00
25	110	18.5	17.4	27.0	5	4.0	6:08
20	109	18.2	17.9	26.0	3	3.5	6:16
15	108	17.9	18.2	25.0	1	2.8	6:21
10	107	17.4	18.9	23.5	0	0.8	6:36
5	105	16.8	19.4	21.0	0	0.0	6:57
0	100	15.0	28.8	2.7	0	0.0	8:04
Mean	112.8	20.4	16.5	30.78	12.4	12.9	5:41
Std. Dev.	4.6	2.9	1.9	6.3	9.6	12.9	0:44
Sample	264	265	247	263	259	260	204

6 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	145	42.5	12.2	50.5	50	75.0	4:04
95	126	27.4	13.2	40.0	35	35.0	4:22
90	124	25.9	13.6	39.0	31	27.5	4:36
85	122	24.9	13.9	38.0	30	24.0	4:42
80	122	24.0	14.1	37.0	28	21.3	4:49
75	121	23.5	14.2	36.0	27	18.5	4:53
70	120	23.0	14.5	35.0	25	16.0	4:58
65	119	22.5	14.6	34.0	23	15.0	5:04
60	118	22.2	14.7	34.0	21	14.0	5:11
55	118	21.8	14.9	33.0	20	12.8	5:20
50	117	21.5	15.0	32.8	19	11.5	5:24
45	116	21.1	15.2	32.0	18	10.5	5:30
40	116	20.8	15.4	31.0	16	9.8	5:37
35	115	20.5	15.5	30.5	14	8.5	5:44
30	115	20.3	15.8	30.0	13	7.5	5:50
25	114	19.7	16.0	29.0	11	7.0	5:57
20	113	19.3	16.4	28.0	9	6.0	6:07
15	112	18.7	16.6	26.5	7	5.0	6:16
10	112	18.1	17.1	24.5	3	3.7	6:30
5	109	17.2	17.6	22.5	0	2.0	6:51
0	104	14.0	19.8	13.7	0	0.0	8:19
Mean	117.7	21.8	15.2	32.2	18.7	14.5	5:29
Std. Dev.	5.8	3.5	1.4	5.6	10.4	11.5	0:48
Sample	332	333	301	329	332	317	316

6 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	140	37.5	12.1	51.2	60	61.0	3:18
95	128	29.2	13.0	38.5	34	39.0	4:14
90	126	26.3	13.2	37.5	30	32.1	4:22
85	124	25.3	13.4	36.0	27	26.0	4:34
80	123	24.5	13.7	34.9	26	24.0	4:40
75	122	24.0	13.9	34.5	25	21.0	4:48
70	121	23.7	14.1	33.6	23	18.9	4:53
65	120	23.2	14.3	33.0	22	16.6	5:00
60	120	22.5	14.4	32.0	21	14.6	5:04
55	119	22.4	14.5	31.0	20	13.4	5:09
50	118	22.0	14.6	30.8	19	12.0	5:15
45	117	21.5	14.9	29.9	17	10.9	5:19
40	116	21.1	15.0	28.9	16	9.8	5:23
35	116	20.7	15.2	27.9	15	8.9	5:29
30	115	20.4	15.6	26.9	14	8.0	5:35
25	114	20.0	15.9	26.3	12	6.8	5:49
20	113	19.5	16.2	25.9	10	6.0	5:58
15	112	19.3	16.7	24.0	7	4.9	6:11
10	111	18.5	17.0	22.0	4	3.0	6:26
5	108	17.5	18.0	19.4	1	1.0	6:44
0	100	14.0	25.4	9.0	0	0.0	7:35
Mean	118.4	23.3	15.1	30.1	18.4	15.1	5:20
Std. Dev.	6.9	3.7	1.7	5.9	9.9	11.6	0:46
Sample	329	328	314	328	331	325	318

7 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	142	43.0	11.5	45.0	61	73.0	3:01
95	132	32.0	12.6	41.0	45	43.1	4:12
90	130	30.0	12.9	39.4	42	34.4	4:23
85	129	28.5	13.1	38.0	40	28.0	4:28
80	128	27.2	13.4	37.0	36	24.0	4:34
75	126	26.5	13.6	36.0	34	20.6	4:40
70	126	25.8	13.7	35.0	32	18.7	4:46
65	125	25.5	14.0	35.0	31	17.0	4:50
60	124	25.0	14.1	34.0	29	15.8	4:55
55	124	24.5	14.2	33.3	28	14.0	5:03
50	123	24.0	14.4	32.7	26	12.5	5:11
45	122	23.5	14.6	32.0	25	11.5	5:17
40	121	23.2	14.8	31.0	24	10.9	5:22
35	121	22.8	14.9	30.0	23	9.5	5:29
30	120	22.3	15.0	29.5	22	8.4	5:38
25	119	21.9	15.3	28.5	20	7.0	5:44
20	118	21.5	15.5	27.8	18	6.0	5:55
15	117	21.0	15.7	27.0	16	5.0	6:04
10	116	20.1	16.0	25.0	12	3.2	6:20
5	114	19.3	16.6	22.0	5	1.1	6:32
0	108	16.0	20.1	13.6	0	0.0	7:18
Mean	123.2	24.7	14.5	32.3	26.9	16.4	5:15
Std. Dev.	6.5	4.1	1.3	5.6	11.7	13.3	0:44
Sample	367	365	365	362	373	370	320

7 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	140	41.3	11.6	45.0	60	199.0	3:32
95	133	33.0	12.4	37.7	44	45.9	3:54
90	131	29.9	12.6	36.0	41	36.0	4:04
85	129	28.0	12.8	35.0	38	30.0	4:13
80	128	27.5	13.0	34.0	36	26.9	4:19
75	127	26.9	13.1	33.0	34	23.4	4:23
70	126	26.2	13.3	32.1	33	21.0	4:28
65	125	26.0	13.5	31.4	32	19.9	4:34
60	125	25.7	13.6	30.7	30	18.0	4:41
55	124	25.0	13.7	30.0	29	16.4	4:46
50	124	24.6	13.9	29.0	27	15.2	4:52
45	123	24.1	14.1	28.3	26	13.7	4:58
40	123	23.9	14.2	28.0	25	12.6	5:04
35	122	23.5	14.4	27.0	23	15.5	5:12
30	121	23.1	14.5	26.0	22	10.0	5:20
25	121	22.7	14.6	25.8	21	9.0	5:25
20	120	22.3	14.8	25.0	20	7.5	5:34
15	118	21.5	15.1	23.7	17	6.5	5:44
10	117	21.0	15.4	21.5	12	5.2	5:57
5	116	20.0	16.0	19.0	8	3.0	6:07
0	113	18.0	26.0	13.0	0	0.0	6:16
Mean	124	25.2	14.0	29.1	27.4	18.7	4:57
Std. Dev.	5.1	3.8	1.4	5.5	10.8	16.4	0:43
Sample	360	359	354	355	365	366	344

8 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	146	70.0	10.2	44.2	55	87.0	3:28
95	138	37.5	12.1	40.0	46	43.6	4:00
90	136	35.0	12.5	38.4	43	34.0	4:10
85	135	32.6	12.7	37.5	41	28.8	4:17
80	134	31.5	12.9	36.7	39	23.7	4:25
75	133	30.5	13.0	35.5	38	21.0	4:31
70	132	29.0	13.2	35.0	36	19.0	4:36
65	131	28.5	13.4	34.0	34	17.2	4:40
60	130	27.5	13.5	33.0	33	16.0	4:45
55	129	27.0	13.7	32.0	32	14.5	4:48
50	128	26.5	13.8	31.0	30	13.5	4:55
45	128	25.9	13.9	30.3	29	12.5	5:00
40	127	25.1	14.2	30.0	27	11.0	5:05
35	126	25.0	14.3	29.0	26	9.6	5:12
30	125	24.5	14.5	28.0	24	8.5	5:19
25	124	24.0	14.7	27.0	23	7.2	5:27
20	124	23.5	14.9	26.0	21	6.4	5:36
15	122	22.8	15.2	24.0	19	5.0	5:49
10	121	22.0	15.5	22.6	16	3.5	6:17
5	118	21.0	16.1	19.2	12	2.0	6:37
0	100	17.4	17.9	9.0	0	0.0	8:17
Mean	128.5	27.9	13.9	31.0	30.0	16.7	5:04
Std. Dev.	6.2	6.3	1.2	6.3	10.6	13.3	0:49
Sample	378	379	364	374	382	373	378

8 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	151	53.9	10.0	44.0	64	94.0	3:14
95	138	36.6	11.7	37.2	51	52.8	3:36
90	136	33.6	12.0	36.0	45	43.4	3:48
85	135	32.0	12.3	35.0	42	38.2	3:56
80	134	31.2	12.5	33.8	40	34.2	4:03
75	133	30.3	12.6	33.0	39	30.0	4:08
70	132	29.8	12.7	32.0	38	26.5	4:13
65	131	29.3	12.9	31.8	37	24.0	4:19
60	131	28.5	13.0	30.9	35	21.3	4:25
55	130	27.8	13.2	30.0	34	19.1	4:29
50	129	27.3	13.3	29.0	33	18.0	4:35
45	128	26.8	13.5	28.5	31	16.8	4:42
40	128	26.5	13.6	28.0	30	15.7	4:46
35	127	26.0	13.8	26.9	29	14.0	4:54
30	126	25.5	14.0	25.7	27	13.0	5:04
25	126	25.0	14.2	25.0	26	11.0	5:13
20	124	24.5	14.4	23.9	23	9.5	5:21
15	124	24.0	14.7	22.1	21	7.8	5:31
10	122	23.5	15.1	20.9	19	6.1	5:50
5	121	22.6	15.7	18.0	15	3.6	6:08
0	116	19.7	24.1	0.0	0	0.0	8:11
Mean	129.4	28.2	13.5	28.7	32.6	22.2	4:43
Std. Dev.	5.5	4.6	1.4	6.1	10.7	15.9	0:47
Sample	426	428	409	426	430	424	384

9 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	183	57.0	11.0	47.0	70	89.8	3:27
95	144	43.0	11.6	40.0	47	51.3	3:43
90	142	39.6	12.0	38.0	44	38.0	3:53
85	141	37.0	12.2	36.5	42	30.5	4:05
80	140	35.5	12.4	36.0	40	27.8	4:11
75	138	34.1	12.5	35.0	38	25.2	4:18
70	137	33.0	12.7	34.0	37	23.2	4:22
65	136	31.8	12.8	33.2	36	21.0	4:27
60	135	31.0	13.0	33.0	34	18.6	4:30
55	134	30.6	13.0	32.0	33	16.9	4:38
50	134	30.0	13.2	31.3	31	15.3	4:43
45	133	29.2	13.4	31.0	30	14.0	4:47
40	132	28.5	13.6	30.0	28	13.0	4:55
35	132	28.0	13.8	29.0	26	11.3	5:02
30	131	27.0	14.0	28.0	25	9.5	5:09
25	130	26.5	14.1	27.0	24	7.9	5:17
20	130	26.0	14.4	26.0	22	7.0	5:28
15	128	25.2	14.7	24.5	19	5.0	5:35
10	127	24.5	15.1	23.0	16	3.7	5:45
5	124	23.1	15.8	19.5	10	2.0	6:15
0	116	19.3	18.6	8.0	0	0.0	7:45
Mean	134.7	31.1	13.5	30.9	30.8	19.0	4:49
Std. Dev.	8.0	6.4	1.3	6.2	11.4	14.8	0:46
Sample	386	388	370	382	382	381	342

9 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (800 M.)
100	159	60.0	10.5	45.0	64	120.0	3:07
95	146	42.1	11.4	36.0	51	65.0	3:28
90	143	37.7	11.7	35.0	48	56.5	3:35
85	141	36.4	11.8	33.5	45	46.4	3:39
80	140	35.4	12.0	32.0	43	41.7	3:45
75	139	33.9	12.2	31.7	41	35.7	3:49
70	138	33.0	12.4	30.6	40	33.0	3:55
65	136	32.0	12.5	30.0	39	30.0	4:02
60	136	31.4	12.6	29.0	38	27.2	4:06
55	135	30.9	12.8	28.5	37	24.7	4:10
50	134	30.1	12.9	28.0	36	22.0	4:18
45	134	29.5	13.0	27.0	34	19.5	4:23
40	133	29.0	13.0	26.0	33	18.0	4:27
35	132	28.5	13.2	25.0	32	17.0	4:35
30	132	28.0	13.4	25.0	30	15.0	4:41
25	130	27.4	13.7	23.0	29	13.2	4:48
20	130	26.5	13.9	22.0	27	11.5	4:59
15	129	25.8	14.1	21.0	25	10.0	5:16
10	127	25.1	14.5	20.0	22	7.9	5:30
5	125	24.0	14.9	16.0	16	4.2	5:50
0	114	19.0	16.8	0.9	0	0.0	8:16
Mean	135.2	31.0	12.9	27.4	35.2	27.7	4:26
Std. Dev.	7.8	5.8	1.4	6.1	10.2	19.6	0:48
Sample	402	403	388	400	399	401	348

10 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (1600 M.)
100	161	65.0	10.4	51.8	76	95.0	6:14
95	153	47.4	11.4	38.2	51	57.6	7:51
90	149	44.0	11.7	37.0	47	44.0	8:11
85	148	41.4	12.0	36.0	43	38.0	8:29
80	146	39.9	12.1	34.5	41	33.2	8:39
75	144	38.0	12.3	33.2	40	28.6	8:49
70	143	36.9	12.5	32.2	39	25.5	9:00
65	142	36.0	12.6	31.5	37	23.0	9:11
60	142	35.0	12.7	30.9	35	20.5	9:20
55	141	34.0	12.9	30.0	34	18.0	9:32
50	140	33.2	13.0	29.0	33	16.0	9:45
45	139	32.5	13.1	28.2	32	14.3	9:58
40	138	32.0	13.2	28.0	30	13.0	10:06
35	138	31.2	13.4	27.0	29	11.4	10:20
30	136	30.5	13.5	26.0	27	10.3	10:34
25	135	29.6	13.7	25.0	26	8.9	10:49
20	134	28.5	14.0	24.0	24	7.0	11:11
15	133	27.9	14.4	23.0	23	5.6	11:27
10	131	26.5	14.7	21.2	20	3.2	12:06
5	130	24.6	15.1	19.0	16	1.6	12:27
0	122	20.5	17.8	11.0	0	0.0	13:13
Mean	140.6	34.5	13.1	29.3	33.3	21.5	8:54
Std. Dev.	8.1	7.2	1.1	6.1	10.9	18.1	1:24
Sample	447	447	409	445	447	441	380

10 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (1600 M.)
100	160	68.0	10.2	53.0	65	120.0	6:19
95	151	46.0	10.9	37.0	53	69.0	7:05
90	148	43.2	11.3	35.0	50	59.6	7:28
85	146	40.9	11.5	34.0	47	52.0	7:41
80	145	39.5	11.7	32.5	46	46.0	7:50
75	144	38.5	11.8	31.9	44	42.2	7:59
70	144	37.0	12.0	31.0	42	38.8	8:09
65	143	36.0	12.1	30.0	41	35.7	8:16
60	142	35.0	12.2	29.5	40	32.8	8:23
55	141	34.0	12.4	28.0	38	30.0	8:32
50	140	33.5	12.5	27.5	37	27.0	8:44
45	139	33.0	12.6	27.0	35	23.5	8:52
40	138	32.3	12.8	26.0	34	21.0	9:03
35	138	31.6	12.9	25.0	33	19.0	9:14
30	137	31.0	13.0	24.2	31	17.0	9:26
25	136	30.5	13.3	23.2	30	15.2	9:49
20	134	29.6	13.4	22.0	28	13.7	10:05
15	134	29.0	13.6	21.0	26	10.6	10:30
10	132	28.0	14.0	19.0	22	8.0	10:55
5	130	26.3	14.7	16.0	17	4.0	11:59
0	126	22.0	18.9	3.5	0	0.0	13:10
Mean	140.4	34.9	12.6	27.4	36.6	31.0	9:00
Std. Dev.	6.5	6.8	1.5	6.4	10.9	20.8	1:25
Sample	450	457	431	455	455	453	422

11 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (1600 M.)
100	169	74.6	10.2	47.2	70	103.0	6:21
95	159	57.4	11.1	39.5	53	61.4	7:25
90	156	51.8	11.5	38.0	49	52.0	7:45
85	155	50.0	11.7	37.0	46	42.0	8:27
80	153	46.3	12.0	35.9	45	35.6	8:37
75	152	44.8	12.0	35.0	43	31.3	8:45
70	151	43.0	12.2	33.6	41	27.4	8:53
65	149	41.7	12.3	32.7	40	25.0	9:02
60	149	40.5	12.5	32.0	39	23.0	9:14
55	148	39.5	12.6	31.2	37	20.4	9:24
50	146	38.5	12.8	30.0	37	18.6	9:35
45	145	37.4	13.0	29.5	35	16.1	9:44
40	144	36.3	13.1	28.5	33	15.0	9:55
35	143	35.0	13.2	27.2	32	13.3	10:10
30	142	34.0	13.3	26.0	30	11.7	11:22
25	141	33.2	13.5	25.0	29	10.0	10:38
20	140	32.4	13.7	24.0	26	7.2	10:52
15	138	31.4	14.0	23.0	24	5.1	11:19
10	137	30.0	14.4	20.0	20	4.0	11:52
5	134	28.5	15.3	16.0	14	1.4	12:15
0	128	24.0	18.5	10.0	0	0.0	13:05
Mean	146.6	40.1	12.9	29.8	35.4	23.8	9:45
Std. Dev.	7.8	9.0	1.2	6.8	11.7	21.2	1:21
Sample	404	403	364	398	398	391	376

11 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (1600 M.)
100	165	71.5	10.0	45.0	74	101.2	6:29
95	156	51.4	10.8	37.0	53	69.4	7:00
90	154	48.0	11.1	35.0	48	61.0	7:15
85	152	45.5	11.3	34.0	46	54.0	7:24
80	150	43.0	11.5	33.0	44	47.9	7:34
75	149	41.1	11.6	32.0	42	42.3	7:46
70	148	40.0	11.9	31.0	41	39.0	7:56
65	147	39.0	11.9	30.0	40	36.0	8:03
60	146	38.2	12.0	29.3	39	33.1	8:11
55	145	37.3	12.1	28.0	37	30.5	8:22
50	144	36.5	12.2	27.0	36	28.5	8:33
45	144	36.0	12.4	26.5	35	25.8	8:45
40	143	35.0	12.5	25.2	33	23.0	8:52
35	142	34.4	12.7	24.5	32	21.0	9:04
30	141	33.9	12.8	23.0	30	19.0	9:14
25	140	33.1	13.0	22.0	30	17.0	9:31
20	138	32.0	13.2	20.6	27	13.1	9:57
15	137	31.2	13.4	19.5	25	10.0	10:31
10	135	30.0	13.8	17.0	23	7.0	11:02
5	133	28.3	14.4	13.0	17	4.0	11:45
0	125	24.8	21.1	5.0	0	0.0	12:10
Mean	144.6	38.2	12.4	26.7	36.0	31.6	8:49
Std. Dev.	7.3	7.7	1.2	7.2	10.4	20.3	1:25
Sample	403	402	380	403	402	400	385

12 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (1600 M.)
100	171	82.5	10.1	55.0	65	160.0	7:06
95	164	62.0	10.9	41.0	53	58.0	7:44
90	161	57.0	11.1	39.0	49	44.4	7:57
85	159	54.7	11.2	37.0	47	38.0	8:18
80	157	52.5	11.4	36.0	45	34.0	8:33
75	157	50.4	11.6	35.0	44	30.4	8:42
70	156	48.5	11.7	34.0	42	26.5	8:53
65	155	47.1	11.9	33.0	40	22.9	9:01
60	154	45.5	12.0	32.0	39	19.7	9:19
55	154	44.4	12.2	31.0	38	18.4	9:33
50	152	43.5	12.3	30.0	37	16.0	9:45
45	152	42.6	12.4	29.0	35	14.0	9:50
40	151	41.5	12.5	28.2	33	12.0	10:09
35	150	40.5	12.7	27.5	31	10.5	10:36
30	148	39.4	12.8	26.0	30	9.4	10:53
25	147	37.5	13.0	25.5	29	8.0	11:16
20	146	36.6	13.2	24.0	25	6.4	11:38
15	145	35.0	13.6	23.0	23	4.4	11:54
10	143	33.6	14.0	21.0	20	2.9	12:26
5	140	31.0	14.5	18.0	16	1.0	12:48
0	133	25.5	17.0	7.0	0	0.0	13:18
Mean	152.4	45.0	12.4	30.3	35.8	21.2	10:00
Std. Dev.	7.3	9.9	1.2	7.2	11.4	18.7	1:37
Sample	422	422	389	415	420	411	262

12 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	METER RUN (1600 M.)
100	175	82.9	9.7	51.0	67	180.0	6:13
95	163	62.3	10.5	36.0	57	70.4	6:50
90	160	54.2	10.8	34.0	53	66.0	7:07
85	158	51.5	11.0	33.0	50	60.7	7:14
80	157	49.0	11.1	32.0	49	53.8	7:25
75	155	47.5	11.2	31.0	46	48.3	7:33
70	154	46.2	11.4	30.0	45	45.3	7:40
65	152	44.5	11.5	29.9	44	41.8	7:46
60	151	43.5	11.6	29.0	42	38.6	7:56
55	151	42.0	11.7	28.0	40	34.8	8:06
50	150	40.5	11.9	27.0	40	31.5	8:16
45	149	39.4	12.0	27.0	38	29.1	8:32
40	148	39.0	12.1	25.9	37	25.5	8:48
35	146	37.9	12.3	25.0	35	22.9	9:03
30	145	36.6	12.5	24.0	34	19.9	9:23
25	145	35.8	12.6	23.0	32	17.0	9:51
20	143	35.0	12.8	22.0	30	14.6	10:14
15	142	34.0	13.0	20.0	28	12.0	10:53
10	141	33.0	13.4	17.0	25	8.0	11:28
5	138	31.3	14.4	13.5	21	4.0	12:06
0	109	16.1	18.8	4.5	0	0.0	13:15
Mean	150	43.0	12.0	26.9	39.4	34.9	8:47
Std. Dev.	8.4	10.02	1.2	6.8	10.9	22.2	1:39
Sample	371	373	362	371	371	367	310

13 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKIN-FOLD (MM.)	METER RUN (2400 M.)
100	175	99.9	10.0	49.0	63	153.9	17.2	9:25
95	168	67.2	10.6	43.0	53	60.0	23.9	11:29
90	165	60.1	10.9	41.0	50	47.0	25.7	12:04
85	164	57.6	11.0	39.2	48	42.3	27.8	12:18
80	162	56.0	11.2	37.5	46	37.2	29.5	12:37
75	161	54.4	11.3	36.5	45	33.6	30.9	13:00
70	160	53.0	11.4	35.8	43	31.4	32.0	13:14
65	159	51.7	11.5	35.0	42	28.0	34.2	13:29
60	158	50.1	11.6	34.0	41	25.3	35.7	13:40
55	157	49.0	11.8	33.0	40	23.1	37.5	14:05
50	157	48.0	11.9	32.0	39	21.0	40.2	14:29
45	156	47.1	12.0	31.0	38	19.0	42.4	14:51
40	155	46.0	12.1	30.0	36	16.4	45.1	15:21
35	154	45.0	12.3	29.0	35	13.1	47.5	15:34
30	153	44.0	12.5	28.0	33	11.4	50.2	15:54
25	152	42.9	12.7	27.0	31	9.4	55.4	16:04
20	151	41.4	12.9	26.0	30	8.0	59.5	16:29
15	150	40.0	13.2	24.0	29	6.0	66.3	16:51
10	148	37.7	13.5	23.0	25	3.9	77.0	17:34
5	146	35.7	14.0	19.0	21	1.6	96.6	18:22
0	137	30.5	21.2	7.0	0	0.0	148.0	19:44
Mean	156.8	49.3	12.2	31.7	38.1	24.7	48.1	14:35
Std. Dev.	6.6	9.6	1.2	7.4	10.1	20.1	35.7	2:07
Sample	525	526	503	518	524	513	474	397

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13 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKINFOLD (MM.)	METER RUN (2400 M.)
100	184	85.0	9.2	54.0	76	102.0	16.5	8:26
95	171	67.0	10.2	37.3	59	75.6	19.3	9:40
90	168	62.0	10.4	35.0	55	67.5	21.0	10:15
85	166	59.3	10.6	33.8	52	62.9	22.0	10:42
80	165	57.0	10.8	33.0	50	60.0	23.5	10:55
75	163	54.3	11.0	32.0	49	53.9	24.6	11:09
70	162	52.1	11.0	31.0	47	50.0	25.4	11:23
65	160	51.0	11.1	30.0	46	46.6	26.4	11:38
60	159	49.9	11.2	29.0	45	43.0	27.1	11:50
55	158	48.0	11.4	28.0	44	41.0	28.1	12:01
50	157	47.0	11.5	27.0	42	38.4	29.6	12:12
45	156	46.2	11.6	26.0	42	35.0	31.2	12:25
40	155	45.4	11.8	25.1	40	31.9	33.0	12:42
35	154	44.1	11.9	25.0	39	29.2	35.5	13:05
30	152	43.2	12.0	23.5	38	25.0	38.3	13:27
25	150	41.7	12.1	22.0	36	21.8	45.0	13:52
20	150	30.0	12.4	21.0	34	18.7	49.2	14:20
15	148	48.5	12.6	18.5	31	16.0	56.0	14:58
10	145	37.0	13.4	16.0	28	11.6	69.0	15:24
5	142	34.0	13.8	13.0	25	5.4	86.7	17:13
0	132	28.8	18.1	4.0	2	0.0	148.6	19:51
Mean	157	48.9	11.8	26.9	42	39.9	41.9	11:39
Std. Dev.	9.0	10.2	2.1	8.3	10.5	25.7	41.8	2:09
Sample	432	433	423	431	431	421	366	413

14 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKINFOLD (MM.)	METER RUN (2400 M.)
100	179	95.6	9.0	55.0	70	99.9	13.2	9:26
95	170	70.2	10.5	43.4	52	52.8	27.0	11:40
90	167	64.0	10.7	41.0	49	43.7	29.3	12:03
85	166	61.1	10.9	39.8	47	37.5	31.5	12:36
80	165	59.4	11.1	38.0	45	33.5	33.5	13:10
75	164	57.0	11.2	37.0	44	30.0	35.3	13:27
70	163	56.1	11.4	36.0	43	26.6	36.9	13:42
65	162	55.0	11.5	35.0	42	24.2	39.1	14:03
60	161	54.0	11.6	34.0	41	23.0	41.6	14:21
55	160	53.0	11.8	33.0	40	20.9	43.5	14:39
50	160	52.0	11.9	32.0	39	19.0	45.5	14:57
45	159	51.3	12.0	31.2	37	16.5	47.1	15:15
40	158	50.2	12.2	30.5	36	14.2	49.8	15:27
35	158	49.0	12.4	29.9	35	12.8	51.9	15:46
30	157	48.0	12.5	28.0	33	11.2	54.4	15:59
25	156	47.0	12.8	27.0	31	9.4	57.8	16:24
20	155	45.5	13.0	26.0	30	7.2	61.5	16:42
15	154	44.4	13.3	24.0	28	5.0	65.9	17:16
10	152	42.6	13.7	22.0	25	2.6	75.8	17:39
5	149	40.0	14.2	18.0	19	0.4	94.0	18:35
0	130	30.7	16.9	10.8	0	0.0	137.8	19:48
Mean	159.8	53.0	12.1	31.9	37.7	22.2	49.5	14:55
Std. Dev.	6.7	9.4	1.2	7.6	10.1	19.7	20.3	2:05
Sample	515	521	501	516	516	493	472	384

14 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKIN-FOLD (MM.)	METER RUN (2400 M.)
100	191	99.9	9.0	52.0	73	150.0	15.0	8:04
95	178	75.0	9.8	40.1	59	79.3	19.2	9:46
90	175	69.0	10.0	38.0	55	71.9	20.6	10:10
85	173	66.4	10.2	36.0	53	65.0	21.7	10:29
80	171	64.0	10.3	34.0	51	62.4	22.5	10:43
75	170	61.5	10.5	33.0	50	59.8	23.3	10:54
70	169	59.2	10.6	32.0	49	57.0	24.2	11:05
65	168	57.5	10.7	31.0	47	54.8	25.3	11:18
60	166	55.9	10.8	30.0	46	52.0	26.0	11:32
55	165	55.0	10.9	29.0	45	48.5	26.9	11:43
50	164	53.5	11.0	28.0	44	45.6	27.9	11:52
45	162	52.0	11.2	27.0	42	41.8	29.0	12:06
40	162	51.0	11.4	26.0	41	38.2	30.5	12:24
35	160	49.3	11.5	25.0	40	35.0	32.6	12:36
30	159	47.5	11.6	24.0	39	33.8	34.7	12:57
25	157	46.6	11.9	23.0	37	29.8	37.3	13:28
20	156	45.0	12.1	21.7	35	25.9	42.8	14:08
15	154	43.2	12.4	20.0	34	21.0	50.4	14:48
10	151	40.5	12.8	16.2	31	15.5	61.4	15:48
5	148	38.0	13.4	14.0	29	8.3	76.0	16:57
0	141	28.0	21.0	4.0	8	0.0	151.4	19:49
Mean	163.8	54.7	11.3	28.0	43.7	46.2	34.7	12:27
Std. Dev.	9.4	11.4	1.2	7.9	9.7	30.4	19.2	2:13
Sample	524	526	516	519	520	515	498	438

15 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKINFOLD (MM.)	METER RUN (2400 M.)
100	187	90.0	9.8	54.3	61	76.0	19.5	9:12
95	171	69.5	10.4	44.2	53	54.9	27.7	11:03
90	168	64.5	10.7	42.0	50	45.2	31.6	11:56
85	167	61.8	10.9	40 0	47	40.0	33.5	12:11
80	166	60.0	11.0	39.0	45	36.0	35.0	12:24
75	164	58.0	11.1	38.0	43	31.0	36.8	12:35
70	164	57.0	11.3	37.0	42	28.4	38.7	12:58
65	163	56.0	11.4	35.6	41	24.0	40.0	13:31
60	162	55.0	11.5	35.0	39	21.2	41.5	13:53
55	162	54.1	11.7	34.0	38	19.7	42.7	14:06
50	161	53.3	11.9	32.0	37	18.1	43.8	14:32
45	160	52.5	11.9	31.0	36	16.5	45.0	14:59
40	160	51.4	12.1	31.0	34	15.0	47.4	15:11
35	158	50.5	12.2	30.0	32	14.0	50.0	15:24
30	158	49.4	12.4	29.0	31	11.6	52.9	16:02
25	157	48.2	12.5	28.0	30	10.5	56.3	16:25
20	156	47.3	12.9	26.6	28	8.8	58.1	16:37
15	155	46.0	13.1	25.0	26	6.5	63.8	17:08
10	154	45.0	13.5	22.5	24	4.8	72.4	17:45
5	151	41.7	14.2	16.0	18	2.0	90.0	18:29
0	141	36.3	18.7	6.2	0	0.0	139.6	19:56
Mean	160.9	54.2	12.1	32.4	36.6	23.4	48.9	14:36
Std. Dev.	6.4	8.8	1.3	8.2	10.4	25.7	19.5	2:17
Sample	330	330	326	321	332	317	310	210

15 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKIN-FOLD (MM.)	METER RUN (2400 M.)
100	195	99.9	8.1	57.0	73	162.5	14.8	8:07
95	181	78.5	9.5	43.0	59	84.0	19.6	9:38
90	179	73.2	9.8	40.0	56	74.5	20.8	10:02
85	177	70.0	10.0	38.6	55	70.0	22.1	10:16
80	176	68.0	10.1	37.0	53	65.6	23.0	10:29
75	175	66.0	10.2	36.0	51	62.2	23.6	10:40
70	174	64.6	10.3	35.0	50	60.3	24.5	10:52
65	173	63.0	10.4	34.0	50	58.9	25.4	11:02
60	172	61.0	10.5	33.0	48	55.1	26.3	11:13
55	171	60.0	10.6	31.0	46	52.5	27.0	11:22
50	170	59.0	10.7	30.0	45	50.0	27.9	11:35
45	169	58.0	10.8	29.0	44	48.0	29.0	11:47
40	168	56.4	11.0	28.0	43	44.8	30.1	11:59
35	166	55.1	11.1	27.0	42	41.5	31.8	12:10
30	165	54.0	11.2	25.5	40	39.8	33.4	12:24
25	164	52.6	11.4	24.0	39	33.0	36.3	12:53
20	163	51.0	11.5	22.0	37	28.8	39.2	13:27
15	161	49.5	11.8	20.0	35	24.0	45.7	13:56
10	159	46.6	12.1	18.0	32	19.1	55.4	14:33
5	156	42.5	12.7	14.0	27	13.8	72.6	16:00
0	148	31.4	15.5	6.0	11	0.8	152.5	19:08
Mean	170	59.9	10.9	29.9	44.8	51.0	33.7	12:00
Std. Dev.	7.7	10.8	2.2	8.7	9.7	31.6	17.8	1:57
Sample	436	433	429	432	436	424	414	330

16 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKINFOLD (MM.)	METER RUN (2400 M.)
100	180	91.5	9.9	50.0	62	65.8	25.0	10:04
95	172	69.5	10.5	44.0	50	50.6	30.6	10:30
90	170	66.0	10.7	42.0	49	45.0	34.0	11:37
85	168	63.0	10.9	40.5	47	40.4	35.8	12:08
80	167	61.5	11.0	39.0	45	37.0	37.1	12:29
75	166	60.0	11.2	38.0	44	32.6	38.2	12:46
70	164	59.0	11.4	37.0	42	30.0	40.7	12:57
65	164	57.0	11.5	36.0	41	28.0	42.2	13:18
60	163	56.3	11.7	35.0	40	24.5	44.8	13:55
55	162	55.0	11.8	34.0	38	21.1	46.7	14:15
50	162	54.5	11.9	33.0	37	19.5	48.5	14:43
45	161	53.4	12.1	33.0	35	17.8	49.9	14:58
40	160	52.5	12.2	31.0	35	15.5	51.8	15:08
35	159	51.5	12.3	30.0	33	14.4	53.6	15:33
30	158	50.5	12.6	29.0	32	12.1	56.0	15:55
25	158	49.5	12.8	28.0	30	10.0	57.8	16:09
20	157	48.6	13.1	27.0	30	8.4	60.8	16:28
15	156	47.9	13.4	24.5	27	6.1	66.4	16:49
10	154	46.1	13.7	22.0	28	3.0	72.0	17:50
5	151	44.0	14.2	18.3	20	1.2	86.9	18:31
0	146	37.5	16.5	3.1	5	0.0	117.6	19:21
Mean	161.8	55.5	12.1	32.7	36.9	23.1	51.9	14:32
Std. Dev.	6.6	8.8	1.4	7.7	9.5	17.7	23.2	2:16
Sample	272	269	265	264	277	250	270	152

16 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKINFOLD (MM.)	METER RUN (2400 M.)
100	196	99.9	8.3	52.0	75	148.6	14.4	8:14
95	184	80.5	9.5	42.0	60	84.0	20.0	9:32
90	182	77.8	9.6	40.8	57	75.0	21.2	9:49
85	181	74.0	9.8	39.4	54	69.9	22.1	9:59
80	180	71.4	9.9	38.0	52	66.0	23.0	10:12
75	178	69.5	10.1	37.0	50	63.5	23.3	10:24
70	178	67.5	10.2	36.0	50	61.0	24.2	10:37
65	176	65.6	10.2	35.0	48	59.5	25.1	10:49
60	175	65.0	10.4	34.0	47	58.0	26.0	11:00
55	174	64.3	10.5	33.0	46	55.0	26.8	11:14
50	174	63.0	10.5	32.0	45	53.9	27.6	11:22
45	172	62.1	10.6	30.9	44	50.5	28.5	11:33
40	172	61.0	10.7	29.0	43	47.8	29.5	11:48
35	171	60.0	10.8	28.0	41	45.2	31.1	12:03
30	170	59.0	11.0	27.0	40	43.0	32.9	12:15
25	168	58.0	11.1	26.0	39	40.2	34.1	12:29
20	167	56.2	11.3	24.7	37	36.5	36.1	13:02
15	165	54.5	11.6	23.0	35	31.1	39.0	13:24
10	163	52.0	11.8	21.0	32	26.5	42.3	14:20
5	160	47.4	12.4	15.0	29	16.7	59.2	16:05
0	143	40.5	19.2	4.0	19	0.0	165.8	18:19
Mean	173	63.9	10.7	31.2	44.7	52.3	31.7	11:46
Std. Dev.	8.5	10.2	1.1	7.9	9.7	20.4	15.9	1:55
Sample	299	298	292	302	300	293	289	198

17 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKIN-FOLD (MM.)	METER RUN (2400 M.)
100	183	95.5	9.9	50.0	64	73.3	21.2	8:28
95	172	66.3	10.4	43.0	50	46.6	31.3	10:29
90	170	63.2	10.8	41.3	48	41.8	34.7	11:26
85	168	62.0	10.9	39.0	45	36.5	36.1	12:05
80	166	61.5	11.1	38.0	44	32.1	37.7	12:32
75	165	60.5	11.3	37.0	42	29.6	39.4	13:00
70	164	59.8	11.4	36.0	41	28.0	41.8	13:39
65	164	58.7	11.5	34.5	40	25.1	42.8	13:58
60	163	57.5	11.7	34.0	39	23.4	44.2	14:24
55	163	56.8	11.8	32.5	37	20.1	46.2	14:47
50	162	55.5	11.9	32.0	36	19.0	47.4	15:14
45	162	54.6	12.0	32.0	35	16.5	49.6	15:25
40	161	54.0	12.2	30.5	33	15.0	50.9	15:37
35	160	53.5	12.3	29.0	32	13.0	52.8	15:43
30	160	52.3	12.4	28.0	30	11.0	55.0	16:01
25	159	50.5	12.7	27.0	28	10.0	57.0	16:17
20	157	49.4	12.9	25.0	25	8.5	61.8	16:37
15	156	48.1	13.1	23.5	24	6.5	67.4	17:00
10	154	46.5	13.5	22.0	20	4.0	74.7	17:12
5	152	43.8	14.3	18.5	18	1.4	84.0	18:28
0	137	32.0	16.4	3.0	0	0.0	113.6	19:22
Mean	161.9	55.7	12.1	31.6	35.3	21.1	51.2	14:43
Std. Dev.	6.2	8.2	1.1	8.1	10.6	14.3	16.7	2:21
Sample	208	205	206	208	207	201	205	121

17 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKIN-FOLD (MM.)	METER RUN (2400 M.)
100	193	99.9	8.9	51.0	69	107.3	16.6	7:57
95	186	83.4	9.5	45.0	58	81.5	21.0	9:27
90	183	78.6	9.8	43.0	55	72.0	22.2	9:50
85	180	76.5	9.9	41.0	53	66.5	23.3	10:07
80	180	74.2	10.0	40.0	51	63.8	24.7	10:22
75	179	73.5	10.0	38.0	50	62.0	25.7	10:40
70	178	71.6	10.1	36.7	49	60.0	26.2	10:54
65	177	70.0	10.2	35.0	48	58.0	27.4	11:06
60	176	68.8	10.4	34.0	47	55.4	28.3	11:30
55	175	67.9	10.5	33.0	45	53.0	28.9	11:42
50	175	66.9	10.5	32.0	44	50.8	29.9	11:51
45	174	66.0	10.6	31.0	43	48.9	31.2	12:06
40	172	65.0	10.8	30.0	42	46.9	32.2	12:20
35	171	62.8	11.0	29.0	41	44.0	34.2	12:49
30	170	61.6	11.0	28.0	40	41.0	36.6	13:12
25	169	61.0	11.1	26.0	39	38.2	39.2	13:48
20	168	59.5	11.3	25.0	38	35.5	41.6	14:02
15	166	56.5	11.5	23.0	35	32.8	44.5	14:28
10	162	53.0	11.9	21.5	33	25.5	52.8	15:25
5	156	48.0	12.6	17.0	30	18.0	72.3	16:32
0	146	35.6	19.0	2.9	0	1.1	177.8	19:17
Mean	173.2	66.7	11.0	32.0	44.2	51.7	35.6	12:19
Std. Dev.	9.9	11.3	3.4	8.7	9.2	24.7	18.8	2:12
Sample	228	226	227	224	232	221	221	142

18 YEAR OLD GIRLS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKINFOLD (MM.)	METER RUN (2400 M.)
100	176	83.6	10.5	48.0	57	78.0	26.1	12:32
95	174	70.1	11.1	44.0	50	45.8	30.7	12:39
90	173	66.5	11.2	43.0	43	42.5	31.8	12:48
85	171	64.2	11.2	41.0	40	36.2	35.9	13:30
80	170	63.4	11.5	40.0	40	31.5	36.7	13:55
75	169	61.5	11.5	39.0	39	26.9	37.0	14:28
70	168	60.0	11.6	37.0	38	21.4	38.6	14:40
65	167	60.0	11.8	36.5	37	15.0	38.8	14:52
60	166	57.0	12.2	35.0	35	14.0	40.2	15:10
55	166	55.6	12.3	33.0	35	13.7	42.0	15:19
50	164	55.5	12.4	32.0	34	11.2	42.1	15:35
45	164	54.4	12.5	32.0	32	11.0	43.6	15:37
40	163	54.0	12.6	30.0	32	10.0	46.0	16:07
35	162	53.0	12.9	30.0	31	9.3	55.3	16:19
30	160	52.3	13.0	29.0	31	7.6	57.0	16:22
25	159	50.6	13.1	27.0	30	5.5	61.0	16:27
20	158	50.5	13.2	26.5	29	4.2	68.9	16:28
15	158	49.5	13.3	25.0	23	3.4	70.8	17:21
10	157	48.5	13.8	23.0	20	2.0	78.0	18:06
5	156	47.1	15.0	18.0	18	1.5	85.9	18:46
0	150	44.5	15.1	12.0	13	0.0	158.5	18:50
Mean	164.5	56.9	12.5	32.7	33.6	17.8	51.9	15:31
Std. Dev.	6.2	7.6	1.1	7.7	8.8	16.2	23.2	1:44
Sample	54	53	52	53	52	52	52	49

18 YEAR OLD BOYS

PERCENTILE	HEIGHT (CM.)	WEIGHT (KG.)	AGILITY (SEC.)	SIT AND REACH (CM.)	SIT-UPS (1 MIN.)	FLEXED ARM HANG (SEC.)	SKIN-FOLD (MM.)	METER RUN (2400 M.)
100	190	99.5	9.2	50.0	70	122.0	18.7	9:17
95	185	90.1	9.4	46.0	59	84.0	21.6	9:34
90	183	82.6	9.5	44.0	54	75.0	22.0	9:45
85	182	80.5	9.7	41.0	52	72.0	22.8	10:16
80	180	77.6	9.8	40.0	50	64.4	23.2	10:27
75	179	76.0	9.8	38.0	49	61.0	24.5	10:52
70	178	74.0	9.9	37.0	49	60.5	25.8	11:01
65	178	72.5	10.0	36.0	47	57.5	26.4	11:14
60	176	71.0	10.2	35.0	46	56.0	28.1	11:24
55	176	70.0	10.3	34.0	45	55.2	29.4	11:33
50	176	69.5	10.4	33.0	45	54.9	29.9	12:05
45	175	67.5	10.4	33.0	43	53.0	31.3	12:14
40	174	65.5	10.4	32.2	42	51.2	32.0	12:25
35	173	64.0	10.6	32.0	41	49.6	36.0	12:44
30	173	63.5	10.7	29.0	40	48.5	37.4	12:55
25	172	62.0	11.3	29.0	39	45.7	38.0	13:02
20	171	61.3	11.3	25.0	38	37.6	46.7	13:56
15	171	60.4	11.4	23.0	36	34.9	48.3	14:48
10	170	57.0	11.7	23.0	33	28.7	51.0	15:32
5	165	55.1	12.4	16.0	29	25.0	62.1	17:06
0	160	52.7	13.2	13.0	15	14.0	102.0	18:18
Mean	175.7	69.9	10.6	33.0	44.1	54.8	35.2	12:23
Std. Dev.	5.7	10.3	0.9	8.4	7.0	19.4	15.5	2:12
Sample	65	66	65	64	66	65	66	67

APPENDIX B

Suggested Reference Table for Per Cent Body Fat

This table is based on the summation of the skinfold thicknesses at four sites (the triceps, biceps, sub-scapular and supra-iliac).

TOTAL SKINFOLD (mm)	FAT (% body weight)			
	Men	Women	Boys	Girls
15	5.5	—	9.0	12.5
20	9.0	15.5	12.5	16.0
25	11.5	18.5	15.5	19.0
30	13.5	21.0	17.5	21.5
35	15.5	23.0	19.5	23.5
40	17.0	24.5	21.5	25.0
45	18.5	26.0	23.0	27.0
50	20.0	27.5	24.0	28.5
55	21.0	29.0	25.5	29.5
60	22.0	30.0	26.5	30.5
65	23.0	31.0	27.5	32.0
70	24.0	32.5	28.5	33.0
75	25.0	33.5	29.5	34.0
80	26.0	34.0	—	—
85	26.5	35.0	—	—
90	27.5	36.0	—	—
95	28.0	36.5	—	—

Acceptable range for per cent body fat: boys — 13-15%
girls — 21-23%

Wayne D. Van Huss, Roy K. Niemyer, Herbert W. Olson and John A. Friedrick. *Physical Activity in Modern Living.* 2nd Edition. 1969.

APPENDIX C

CROSS COUNTRY TIME SHEET

Times at Mile – Check One – 1( ) 2( ) 3( ) 4( ) 5( ) 6( ) Final ( )

Clerk _____

Number	Number	Number	Number	Number	Number
:01	:01	:01	:01	:01	:01
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